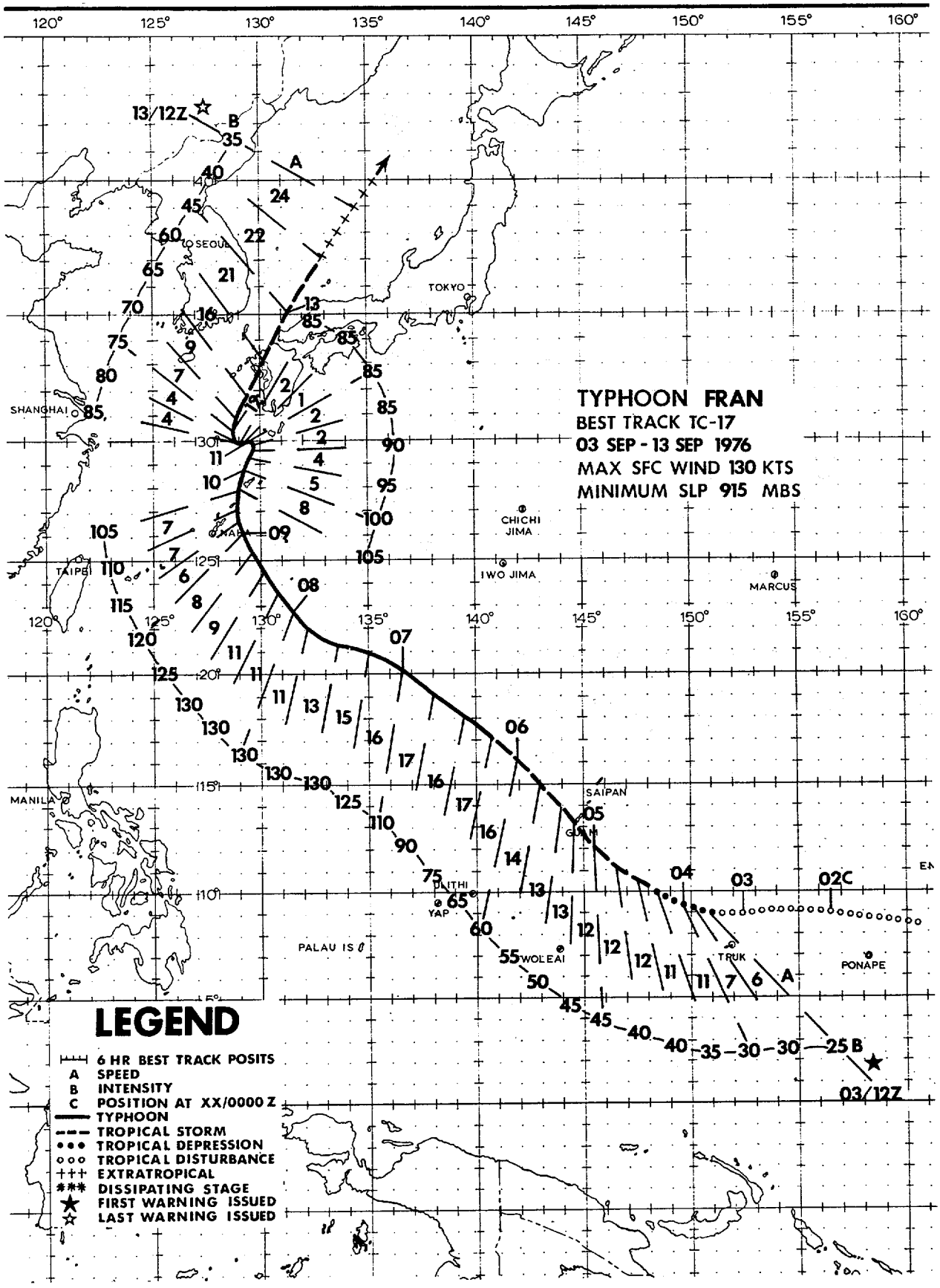
TYPHOON FRAN
BEST TRACK TC-17
03 SEP - 13 SEP 1976
MAX SFC WIND 130 KTS
MINIMUM SLP 915 MBS
LEGEND
6 HR BEST TRACK POSITS
A SPEED
B INTENSITY
C POSITION AT XX/0000 Z
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
13/12Z
03/12Z
SEOUL
TOKYO
SHANGHAI
TAIPEI
CHICHI JIMA
IWO JIMA
MARCUS
MANILA
SAIPAN
GUAM
YAP
PALAU IS
WOLEAI
TRUK
PONAPE
120°
125°
130°
135°
140°
145°
150°
155°
160°

Fran, the 17th storm of the season, began as an innocuous area of convective activity in the monsoon trough. Its life span of 10 days included development to super typhoon intensity and a destructive passage through the Japanese archipelago.

First detected on the afternoon of the 1st of September as an area of convective activity 200 nm northeast of Ponape, the system was monitored for 2 days before exhibiting any significant development. The initial warning on TD 17 was issued at 1200Z on the 3rd after satellite data indicated the disturbance had strengthened, and further intensification was expected. The depression was upgraded to Tropical Storm Fran after reconnaissance aircraft at 0339Z on the 4th recorded a central pressure of 997 mb. Aircraft data further indicated that the storm was heading northwestward at 11 kt. Mid-tropospheric synoptic data showed a weakness in the subtropical ridge south of Japan, toward which Fran was moving.

By 0000Z on the 5th the storm was 90 nm south of Guam, continuing on its northwestward track. Nine hours later Fran passed 20 nm west of Guam. A maximum sustained wind of 30 kt with gusts to 41 kt was reported on the island. By the morning of the 6th Fran had intensified to 60 kt while moving toward the northwest at 14 kt (Fig. 4-34). At 0245Z aircraft reported that the storm was some 250 nm north-northwest of Guam. During this reconnaissance flight maximum surface winds were estimated at 65 kt and a circular eye 30 nm in diameter was observed. Based on this information and a recorded central pressure of 977 mb, Tropical Storm Fran was upgraded to a typhoon.

As Fran reached typhoon intensity, upper tropospheric data indicated development of two anticyclones to the north and east of the storm which acted to suppress outflow from the northeast semicircle of the typhoon. By the morning of the 7th the anticyclones had dissipated, allowing unhindered outflow. This outflow was enhanced by the deepening of a short wave trough over central China which produced a highly efficient link to the mid-latitude westerlies. In response Fran began to deepen explosively. On the 7th at 0307Z reconnaissance aircraft recorded a central pressure of 916 mb and observed maximum surface winds estimated at 130 kt. During the previous 12 hours the central pressure dropped 43 mb, a rate of 3.6 mb per hour.

For 24 hours the upper tropospheric outflow remained unhindered, permitting the storm to maintain its maximum 130 kt super typhoon intensity (Fig. 4-35). On the 7th at 2109Z the central pressure reached its

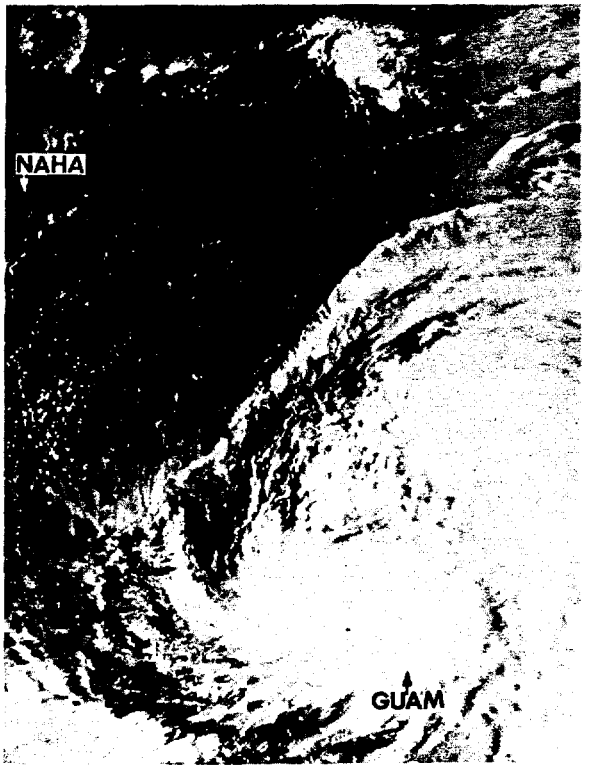

FIGURE 4-34. *Fran at 60 kt intensity 190 nm northwest of Guam, 5 September 1976, 2150Z. (DMSP imagery)*

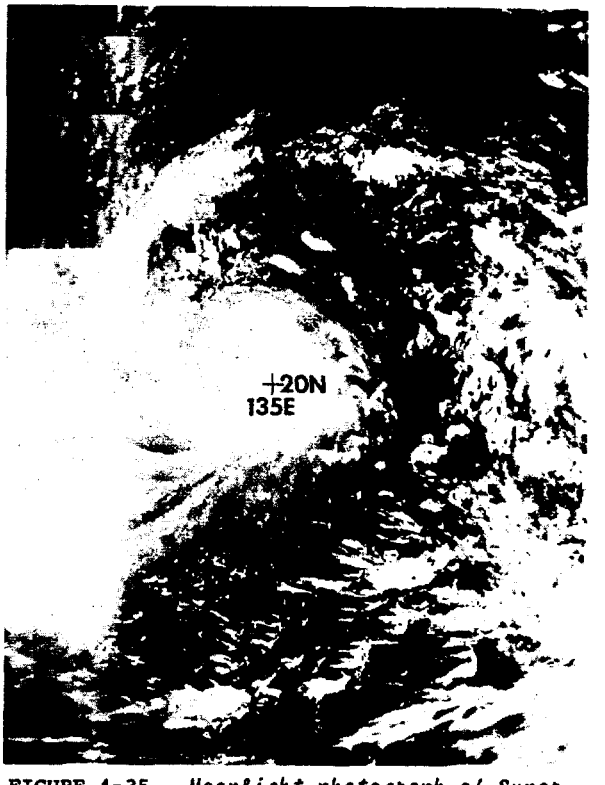

FIGURE 4-35. *Moonlight photograph of Super Typhoon Fran with winds near 130 kt 450 nm southeast of Kadena AB, Okinawa, 7 September 1976, 1023Z. (DMSP imagery)*

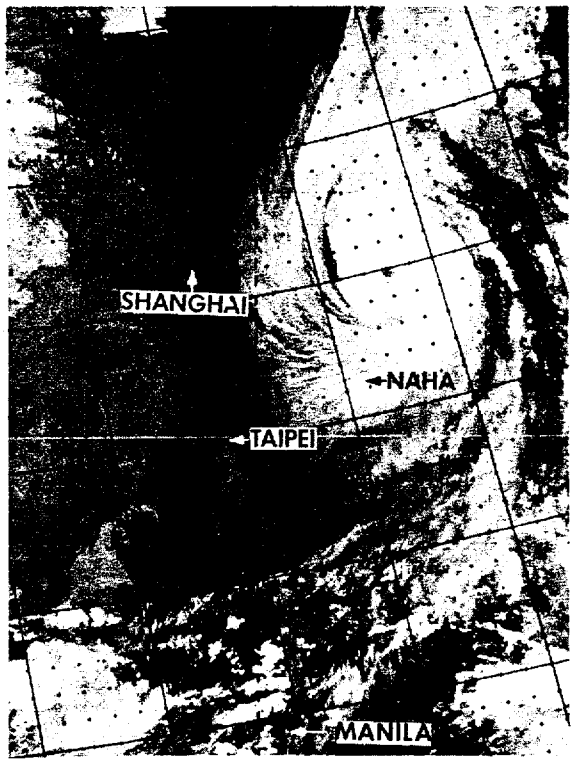

FIGURE 4-36. *Inverted infrared photograph of Typhoon Fran during period of erratic movement with 90 kt intensity 210 nm north-northeast of Kadena AB, Okinawa, 10 September 1976, 1129Z. (DMSP imagery)*

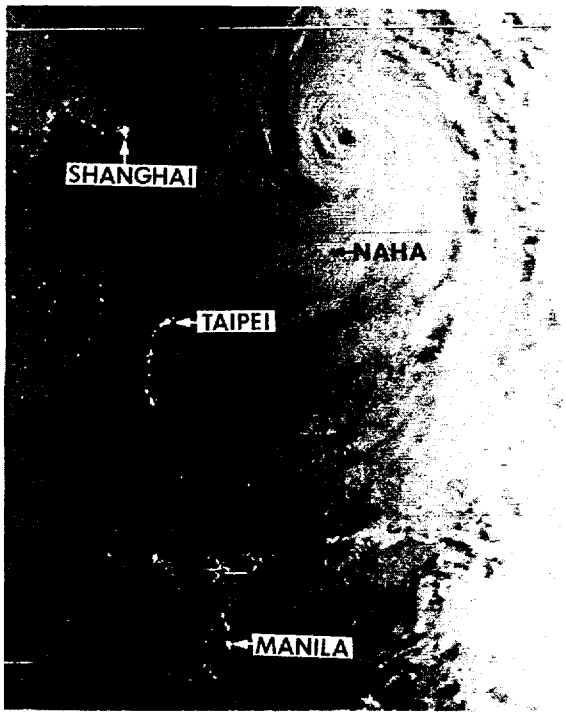

FIGURE 4-36a. *Moonlight visual presentation of Figure 4-36. Bright areas are city lights and bright horizontal lines are lightning discharges. (DMSP imagery)*

FIGURE 4-36b. *Figure 4-36a expanded.*

lowest observed level of 913 mb.

As the short wave trough northwest of Fran moved eastward, northeasterly flow from the upper level Asian anticyclone began to hinder outflow in the western semicircle of the storm. Consequently, by the evening of the 8th the storm had weakened to 125 kt, and had begun to move northward in response to the retrogression of an upper tropospheric short-wave trough to a position west of the storm.

As Fran traveled through the Ryukyu Islands, it passed 60 nm east of Okinawa. Naha (47930) recorded a maximum sustained surface wind of 55 kt with gusts to 73 kt. Some damage was experienced at Kadena AB on Okinawa.

By the evening of the 10th Fran had slowed to 2 kt (Fig. 4-36, Fig. 4-36a, and Fig. 4-36b), and during the subsequent 36 hours drifted on an erratic path toward the west. On the night of the 11th Fran began to accelerate northward (Fig. 4-37) and by the following morning was moving toward the north-northeast at 7 kt. These irregular movements were apparently in response to east-west oscillations of the upper tropospheric short-wave trough north of the storm.

During this period of slow, erratic movement the storm's destructive winds caused several maritime mishaps. JICS, a ship of Panamanian registry, ran aground at Tibjima, Minamata Bay on September 12th and the Kyoyu Maru reportedly broke in two in the Bungo Straits on the 11th.

On the afternoon of the 12th the storm accelerated and moved toward the north-northeast in response to a deepening upper tropospheric trough over central China. Passing over Kyushu on the evening of the 12th, Typhoon Fran had weakened to tropical storm intensity. Twelve hours later, as the storm traveled over the cooler Sea of Japan, it lost its tropical features becoming extratropical at 0600Z on the 13th.

Typhoon Fran's slow movement through the Tokara Island group, over Kyushu, and into the Sea of Japan caused significant damage and loss of life. It was reported to be the most destructive tropical cyclone affecting Japan in the last 10 years. The Japanese National Police Agency confirmed a total of 133 persons dead, 32 missing and 227 injured as a result of Fran's torrential rains and strong winds. According to the Japan Times of 15 September, damage to private and public facilities was estimated at approximately $572 million.

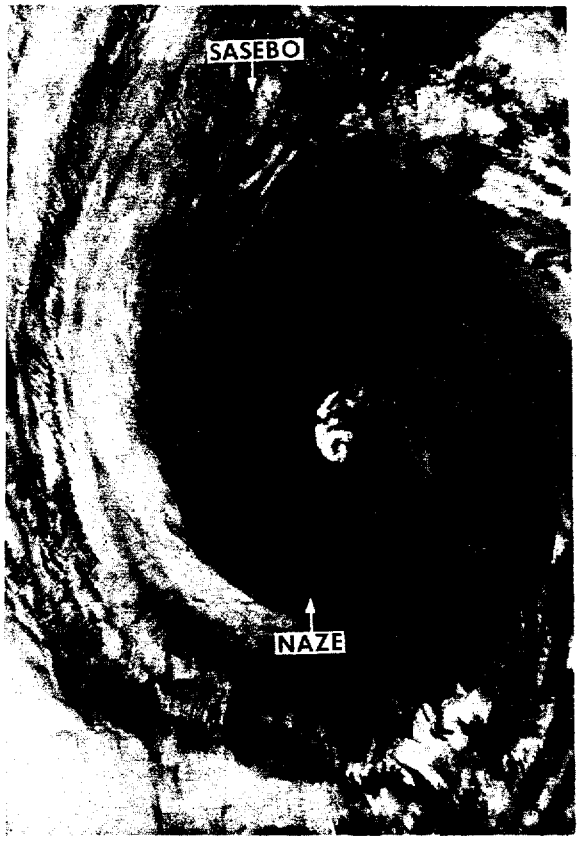

FIGURE 4-37. *Infrared photograph of Typhoon Fran at 75 kt 190 nm south-southwest of Sasebo, 11 September 1976, 1116Z. (DMSP imagery)*